

What is claimed is:

[Claim 1] 1. A halo implant method, comprising the steps of:

(a) providing first and second semiconductor structures formed on a same semiconductor substrate,
wherein the first semiconductor structure comprises a first gate region, a first channel region, and first and second semiconductor regions,
wherein the first gate region is on top of the first channel region and is oriented in a first direction,
wherein the first channel region is sandwiched between the first and second semiconductor regions,
wherein the second semiconductor structure comprises a second gate region, a second channel region, and third and fourth semiconductor regions,
wherein the second gate region is on top of the second channel region and is oriented in a second direction,
wherein the second channel region is sandwiched between the third and fourth semiconductor regions, and
wherein the first and second channel regions are of a same channel polarity,
wherein the first and second directions are essentially parallel to a top surface of the semiconductor substrate and are not parallel to each other; and
(b) halo-implanting the first, second, third, and fourth semiconductor regions in a third projected direction, wherein the third projected direction is essentially a bisector direction of the first and second directions.

[Claim 2] 2. The method of claim 1, further comprising the step of halo-implanting the first, second, third, and fourth semiconductor regions in a fourth projected direction, wherein the fourth projected direction is essentially opposite to the third projected direction.

[Claim 3] 3. The method of claim 1, wherein the first direction is essentially perpendicular to the second direction.

[Claim 4] 4. The method of claim 1, wherein the substrate is p-doped and the step of halo-implanting the first, second, third, and fourth semiconductor regions in the third and fourth projected directions comprises p-type dopant implantation.

[Claim 5] 5. A halo implant method, comprising the steps of:

(a) providing first and second semiconductor structures formed on a same semiconductor substrate,
wherein the first semiconductor structure comprises a first gate region, a first channel region, and first and second semiconductor regions,
wherein the first gate region is on top of the first channel region and is oriented in a first direction,
wherein the first channel region is sandwiched between the first and second semiconductor regions,
wherein the second semiconductor structure comprises a second gate region, a second channel region, and third and fourth semiconductor regions,
wherein the second gate region is on top of the second channel region and is oriented in a second direction,
wherein the second channel region is sandwiched between the third and fourth semiconductor regions,
wherein the first and second channel regions are of a same channel polarity,
wherein the first and second directions are essentially parallel to a top surface of the semiconductor substrate; and
(b) if the first and second directions are not essentially parallel to each other, halo-implanting the first semiconductor region, but not the third and fourth semiconductor regions, in a third projected direction, wherein the third projected direction is essentially perpendicular to the first direction and going from the first semiconductor region toward the first gate region; and
(c) if the first and second directions are essentially parallel to each other, halo-implanting the first and third semiconductor regions, but not the second and fourth semiconductor regions, in a fourth projected direction, wherein the

fourth projected direction is essentially perpendicular to the first direction and going from the first semiconductor region toward the first gate region.

[Claim 6] 6. The method of claim 5, wherein step (b) also halo-implants the second semiconductor region.

[Claim 7] 7. The method of claim 6, further comprising the step of, if the first and second directions are not essentially parallel to each other, halo-implanting the first and second semiconductor regions, but not the third and fourth semiconductor regions, in a fourth projected direction, wherein the fourth projected direction is essentially perpendicular to the first direction and going from the second semiconductor region toward the first gate region.

[Claim 8] 8. The method of claim 7, further comprising the step of, if the first and second directions are not essentially parallel to each other, halo-implanting the third and fourth semiconductor regions, but not the first and second semiconductor regions, in a fifth projected direction, wherein the fifth projected direction is essentially perpendicular to the second direction and going from the third semiconductor region toward the second gate region.

[Claim 9] 9. The method of claim 8, further comprising the step of, if the first and second directions are not essentially parallel to each other, halo-implanting the third and fourth semiconductor regions, but not the first and second semiconductor regions, in a sixth projected direction, wherein the sixth projected direction is essentially perpendicular to the second direction and going from the fourth semiconductor region toward the second gate region.

[Claim 10] 10. The method of claim 9, wherein the first direction is essentially perpendicular to the second direction.

[Claim 11] 11. The method of claim 5, wherein step (b) essentially does not halo-implant the second semiconductor region.

[Claim 12] 12. The method of claim 11, further comprising the step of, if the first and second directions are not essentially parallel to each other, halo-implanting the second semiconductor regions, but essentially not the first, third, and fourth semiconductor regions, in a fourth projected direction, wherein the fourth projected direction is essentially perpendicular to the first direction and going from the second semiconductor region toward the first gate region.

[Claim 13] 13. The method of claim 12, further comprising the step of, if the first and second directions are not essentially parallel to each other, halo-implanting the third semiconductor region, but essentially not the first, second, and fourth semiconductor regions, in a fifth projected direction, wherein the fifth projected direction is essentially perpendicular to the second direction and going from the third semiconductor region toward the second gate region.

[Claim 14] 14. The method of claim 13, further comprising the step of, if the first and second directions are not essentially parallel to each other, halo-implanting the fourth semiconductor region, but essentially not the first, second, and third semiconductor regions, in a sixth projected direction, wherein the sixth projected direction is essentially perpendicular to the second direction and going from the fourth semiconductor region toward the second gate region.

[Claim 15] 15. A semiconductor structure, comprising:

(a) first and second semiconductor structures formed on a same semiconductor substrate,
wherein the first semiconductor structure comprises a first gate region, a first channel region, and first and second semiconductor regions,
wherein the first gate region is on top of the first channel region and is oriented in a first direction,
wherein the first channel region is sandwiched between the first and second semiconductor regions,
wherein the second semiconductor structure comprises a second gate region, a second channel region, and third and fourth semiconductor regions,
wherein the second gate region is on top of the second channel region and is oriented in a second direction,
wherein the second channel region is sandwiched between the third and fourth semiconductor regions,
wherein the first and second channel regions are of a same channel polarity,
wherein the first and second directions are essentially parallel to a top surface of the semiconductor substrate and are not parallel to each other; and
(b) a halo ion beam having a projected direction which is essentially a bisector direction of the first and second directions.

[Claim 16] 16. The semiconductor structure of claim 15, wherein the first semiconductor region, but not the third and fourth semiconductor regions, is in a path of the halo ion beam.

[Claim 17] 17. The semiconductor structure of claim 16, further comprising a mask formed on top of the third and fourth semiconductor regions, wherein the mask essentially blocks the halo ion beam from the third and fourth semiconductor regions.

[Claim 18] 18. The semiconductor structure of claim 16, wherein the second semiconductor region is in a path of the halo ion beam.

[Claim 19] 19. The semiconductor structure of claim 16, wherein the second semiconductor region is not in a path of the halo ion beam.

[Claim 20] 20. The semiconductor structure of claim 15, wherein the first direction is essentially perpendicular to the second direction.